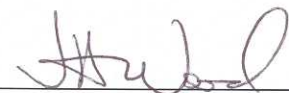


CRITERION 735

WET STANDPIPE SYSTEMS

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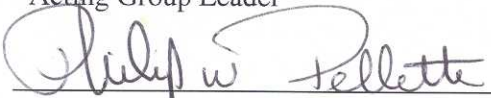
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RECORD OF REVISIONS

Revision No.	Date	Description
0	04/30/98	Initial Issue
1	09/12/02	<p>This revision reflects the conversion from a WordPerfect document into a Microsoft Word document and additional clarification on how to develop criteria. This revision includes:</p> <ul style="list-style-type: none">• the addition of a Table of Contents,• the use of basis statements in Sections 6, 7, and 9,• revision to Section 9, "Required Documents," and• further clarification in the use of references.

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CRITERION 735

WET STANDPIPE SYSTEMS

1.0 PURPOSE

The purpose of this Criterion is to establish the minimum requirements and best practices for operation and maintenance of wet standpipe systems at LANL.

This document addresses the requirements of LIR 230-05-01(Ref 10.1), "Operations and Maintenance Manual" and the requirements of LIR 402-910-01.4, "LANL Fire Protection Program."

Implementation of this Criterion satisfies DOE Order 430.1A (Ref 10.2) for the subject equipment/system. DOE Order 430.1A (Ref 10.2) "Life Cycle Asset Management," Attachment 2 "Contractor Requirements Document," Paragraph 2, Section A through C, which in part requires UC to "...maintain physical assets in a condition suitable for their intended purpose," and employ "preventive, predictive, and corrective maintenance to ensure physical asset availability for planned use and/or proper disposition." Compliance with DOE Order 430.1A is required by Appendix G of the UC Contract.

2.0 SCOPE

The scope of this Criterion includes the routine inspection, testing and preventive and predictive maintenance of all LANL wet standpipe systems. This Criterion does not address corrective maintenance actions required to repair or replace equipment.

3.0 ACRONYMS AND DEFINITIONS

3.1 Acronyms

AHJ	Authority Having Jurisdiction
CFR	Code of Federal Regulations
DOE	Department of Energy
FDC	Fire Department Connection
LIR	Laboratory Implementing Requirement
LPR	Laboratory Performance Requirement
NFPA	National Fire Protection Association
O&M	Operations and Maintenance
OS&Y	Outside Screw and Yoke valve

PP&PE	Personal Property and Programmatic Equipment
RP&IE	Real Property and Installed Equipment
SSC	Structures, Systems, and Components
SSS	Support Services Subcontractor
UC	University of California

3.2 Definitions

Management Level Determination (ML1, ML2, ML3, ML4)-A classification system for determining the degree of management control applied to facility work. See LIR 230-01-02 for definitions of each ML level.

Wet Pipe Standpipe System- A standpipe system is a piping system that provides a fixed means of transporting water for fire fighting from a reliable water supply to designated areas of a building. A wet standpipe system is constantly charged with water from the water supply to hose stations in the building.

4.0 RESPONSIBILITIES

4.1 FWO-Systems, Engineering and Maintenance (FWO-SEM)

4.1.1 FWO-SEM is responsible for the administrative content of this Criterion and monitoring the applicability and the implementation status of this Criteria and either assisting the organizations that are not applying or meeting the implementation expectations contained herein or elevating their concerns to the director(s).

Basis: LIR 301-00-01.11; Issuing and Managing Laboratory Operations Implementation Requirements and Guidance, Section 5.4, OIC Implementation Requirements.

4.1.2 FWO-SEM shall provide technical assistance to support implementation of this Criterion.

4.2 FWO-Fire Protection (FWO-FIRE)

4.2.1 FWO-FIRE is responsible for the technical content of this Criterion and monitoring the proper implementation across the Laboratory.

4.2.2 FWO-FIRE shall provide technical assistance to support implementation of this Criterion

4.3 Facility Manager

Responsible for operations and maintenance of institutional, or Real Property and Installed Equipment (RP&IE) under their jurisdiction, in accordance with the requirements of this document.

Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document that may be assigned to the FM in accordance with the FMU-specific Facility/Tenant Agreement.

4.4 Group Leader

Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document, which are under their jurisdiction.

Responsible for system performance and subsequent replacement or refurbishment of assigned PP&PE.

4.5 Authority Having Jurisdiction (AHJ) – Fire Marshal

The AHJ is responsible for providing a decision on a specific technical question regarding this Criterion.

The LANL Fire Marshal is the approval authority for any exceptions or variances to this Criterion.

The LANL Fire Marshal is the approval authority for design changes to wet standpipe systems, including modifying, removing or abandoning existing systems.

4.6 Support Services Subcontractor

Responsible for providing ITM of the fire protection systems addressed in this Criterion at the request of the responsible Facility Manager.

Responsible for coordinating work with operating group and Facility Manager to conduct ITM in the affected area.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Precautions

This section is not intended to identify all applicable precautions necessary for implementation of this Criterion. A compilation of all applicable precautions shall be contained in the implementing procedure(s) or work control authorization documents. The following precautions are intended only to assist the author of a procedure or work control document in the identification of hazards/precautions that may not be immediately obvious.

5.2 Limitations

The intent of this Criterion is to identify the minimum generic requirements and recommendations for SSC operation and maintenance across the Laboratory. Each user is responsible for the identification and implementation of additional facility specific requirements and recommendations based on their authorization basis and unique equipment and conditions, (e.g., equipment history, manufacturer warranties, operating environment, vendor O&M requirements and guidance, etc.).

Nuclear facilities and moderate to high hazard non-nuclear facilities will typically have additional facility-specific requirements beyond those presented in this Criterion. Nuclear facilities shall implement the requirements of DOE Order 4330.4B (Ref. 10.3) as the minimum programmatic requirements for a maintenance program. Additional requirements and recommendations for SSC operation and maintenance may be necessary to fully comply with the current DOE Order or CFR identified above.

6.0 REQUIREMENTS

Minimum requirements that Criterion users shall follow are specified in this section. Requested variances and exceptions to these requirements shall be prepared and submitted to FWO-SEM in accordance with LIR 301-00-02 (Ref. 10.4), "Variances and Exceptions to Laboratory Operations Requirements," for review and approval. The Criterion users are responsible for analysis of operational performance and SSC replacement or refurbishment based on this analysis. Laws, codes, contractual requirements, engineering judgement, safety matters, and operations and maintenance experience drive the requirements contained in this section. Variances and exceptions to this Criterion shall be approved by the LANL Fire Marshal.

6.1 Operations Requirements

6.1.1 Operational Checklist

The wet standpipe system must be operational at all times. The wet standpipe system shall be deemed operational when the following conditions exist:

- the system is filled with water,
- the control valve is open,
- hose connection valves are operational and capped,
- water flow alarm is operational,
- system hose valves are in their required locations and are arranged so that hoses can be connected,
- the system's piping, fittings, and hangers are in good repair, and
- adequate water pressure and volume are available.

Basis: NFPA 14, 2000 Edition Standard for the Installation of Standpipe, Private Hydrant and Hose Systems, Chapter 3. Compliance with NFPA code is required per Appendix G of the UC/DOE Contract.

6.1.2 Weekly/Monthly Inspections

6.1.2.1 Control Valves

Visually inspect all system control valves and valves with tamper switches to ensure the following:

- valves are in correct position,
- valves are sealed, locked, or supervised,
- valves are accessible,
- valves have appropriate wrenches,
- valves are free from leaks, and
- valves have appropriate identification, including the system or portion of a system they control

Inspect sealed valves WEEKLY. Inspect locked valves and valves with tamper switches MONTHLY.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Chapter 12, Table

12.1. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.1.3 Quarterly Inspections

(a) Hose valves:

Visually inspect all hose valves to ensure the outlet hose threads are:

- undamaged, the handwheel is not broken or missing,
- no leaks are present, and
- required adapters are in place.

NOTE: Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Section 12. Compliance with this NFPA code is required per Appendix G of the UC contract.

(b) Pressure Regulating Valves (if applicable):

Visually inspect all pressure regulating valves to ensure valves are:

- in the open position,
- not leaking,
- maintaining adequate downstream pressure, and
- in good condition.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Section 12.5.1.1. Compliance with this NFPA code is required per Appendix G of the UC contract.

(c) FDCs:

Fire Department Connections (FDCs) shall be inspected to verify the following:

- FDCs are visible and accessible.
- Couplings or swivels are undamaged and rotate smoothly.
- Plugs or caps are in place and undamaged,

- If FDC plugs or caps are not in place, the interior of the FDC shall be inspected for obstructions and the valve clapper shall be verified to be operational over its full range.
- Gaskets are in place and in good condition.
- Identification signs are in place.
- Check valve is not leaking.
- The automatic drain valve (ball drip) is in place and operating properly.
- Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Section 12.7.1. Compliance with this NFPA code is required per Appendix G of the UC contract.

(d) Other system components:

Visually inspect all other components of the standpipe system (pipe supports, exterior of piping and valves, etc.) to ensure the system is free of corrosion, foreign material, physical damage, tampering, or other conditions that would prevent operation.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Chapter 6, Table 6-1. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.1.4 Other Inspection Time Frames

Internally inspect all check valves every 5 years to verify all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Section 12.4.2.1. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.2 Testing Requirements

6.2.1 Semi-Annually

When provided, test water flow alarms on a quarterly basis, and supervisory signals on a semi-annual basis.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Section 12.2.7. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.2.2 Annually

- Conduct a partial flow test adequate to move the valve from its seat (for pressure regulating valves).
- Fully close and reopen the control valve(s).

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Section 12.5.1.3 and 12.3.3.1. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.2.3 Other Time Frames

- Conduct an initial flow test by flowing the required volume of water at the hydraulically most remote, highest, or dead-end hose connection of each zone of the standpipe system. When a flow test of the hydraulically most remote outlet is not practical, consult FWO-FIRE (7-9045) for a more appropriate location for the test. Conduct a flow test every 5 years thereafter. Use the design requirements in effect at the time of the installation for all testing. FWO-FIRE must approve test method(s) and performance criteria in advance.
- Flush test and hydrostatically test the system initially and after any repairs or modifications to system flow-path or pressure boundary components. The minimum rate of flow during flushing should not be less than the water demand rate of the system. Hydrostatically test at not less than 200 psi for 2 hours, or 50 psi in excess of maximum pressure (when maximum pressure is in excess of 150 psi).

NOTE: Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Chapters 6, 12 and 14. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.3 Maintenance

6.3.1 Valves

- Annually lubricate the operating stems of outside screw and yoke (OS&Y) valves. Then close and reopen the valve completely to test its operation and distribution of the lubricant. Graphite is recommended.
- Clean, repair, or replace internal components in all system valves as necessary in accordance with the manufacturer's recommendations.

Basis: NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, Section 12.3.4 and 12.4.1.3.1. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.3.2 Standpipe Systems

- Refer to Appendix A: Quarterly Inspection of Wet Standpipe Systems in this Criterion, for a description of suggested maintenance activities.
- Provide additional maintenance as recommended by the manufacturer's instructions for all components of standpipe systems.

Basis: NFPA 14, 2000 Edition Standard for the Installation of Standpipe, Private Hydrant and Hose Systems, Chapter 3. Compliance with NFPA code is required per Appendix G of the UC/DOE Contract.

6.4 Impairments and Modifications

6.4.1 If one or more of the operational requirements listed in Section 6.1.1 are not maintained, follow the actions outlined in Criterion 733, Fire Protection System Impairment Control Program. Following maintenance/repair work to the system pressure boundary or flow path, and prior to returning the affected wet standpipe system to service, perform visual inspections, flushing and hydrostatic testing as described above.

6.4.2 Following modifications to the pressure boundary or flow path of the wet standpipe system, and prior to returning the system to service, perform visual inspections, flushing and hydrostatic testing as described above.

6.4.3 Following modifications to any other portion of the wet standpipe system, and prior to returning the system to service, perform visual inspections as described above.

6.5 Personnel Requirements

6.5.1 Operational testing and alarm verification will be conducted by SSS personnel, in compliance with LIR 402-910-01, Section 6.0.

Basis: LIR 402-910-01.4, LANL Fire Protection Program

7.0 RECOMMENDATIONS AND GOOD PRACTICES

The information provided in this section is recommended based on acceptable industry practices and should be implemented by each user based on his/her unique application and operating history of the subject systems/equipment.

7.1 Operations Recommendations

There are no operations recommendations for this Criterion.

7.2 Maintenance Recommendations

7.2.1 Persons other than SSS Fire Protection Maintenance personnel may conduct visual inspection requirements identified in this document.

Basis: LIR 402-910-01.4, LANL Fire Protection Program

8.0 GUIDANCE

8.1 Operations Guidance

No operations guidance available.

8.2 Maintenance Guidance

No maintenance guidance available.

9.0 REQUIRED DOCUMENTATION

Maintenance history shall be maintained by the FM for wet standpipe systems to include, as a minimum, the parameters listed in the Table 9-1 below:

Table 9-1 Documentation Parameters

MAINTENANCE HISTORY DOCUMENTATION PARAMETERS				
PARAMETER	ML 1	ML 2	ML 3	ML 4
Maintenance Activities				
Repair / Adjustments	X	X	X	X
PM Activities	X	X	X	X
Equipment Problems				
Failure Dates	X	X	X	X
Failure Root Cause	X	X	X	X
Inspection Results (inspections as required by this Criterion)				
Inspection Date	X	X	X	X
SSC Condition	X	X	X	X

Basis: Documentation of the parameters listed in Table 9-1 above satisfies the requirements of LPR 230-07-00, Criteria 2, (Ref. 10.5) which states; "Maintenance activities, equipment problems, and inspection and test results are documented."

10.0 REFERENCES

The following references, and associated revisions, were used in the development of this document.

- 10.1 LIR 230-05-01.0, Operations and Maintenance Manual.
- 10.2 DOE O 430.1A, Attachment 2 "Contractor Requirements Document" (Paragraph 2, Sections A through C), a requirement of Appendix G of the UC Contract.
- 10.3 DOE Order 4330.4B, Maintenance Management Program, Section 3.4.9.
- 10.4 DOE Approved Equivalency for NFPA 25, 1998 Standard for Water-Based Fire Protection Systems.
- 10.5 LIR 301-00-02.0, Variances and Exceptions to Laboratory Operation Requirements.
- 10.6 LPR 230-07-00, Maintenance History, Performance Criteria [2].
- 10.7 LIR 402-910-01.4, LANL Fire Protection Program

10.8 NFPA 14, 2000 Edition for Standpipe, Private Hydrant, and Hose Systems

10.9 NFPA 25, 2002 Edition Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems

11.0 APPENDICES

Appendix A: Quarterly Inspection of Wet Standpipe Systems

Appendix B: Testing Requirements

APPENDIX A- Inspection and Testing of Wet Standpipe Systems

QUARTERLY CHECK POINTS	CORRECTIVE ACTION
HOSE VALVE OUTLETS	
1. Cap missing	1. Replace
2. Hose connection damaged	2. Repair
3. Valve handles missing	3. Replace
4. Gaskets missing/deteriorated	4. Replace
5. Valve leaking	5. Close/Repair
6. Visible obstructions	6. Remove
PIPING	
1. Piping damaged	1. Repair
2. Control valves damaged	2. Repair/Replace
3. Pipe support device missing or damaged	3. Repair/Replace
4. Supervisory devices damaged	4. Repair/Replace
CABINET	
1. Check overall condition	1. Repair or replace parts as necessary
2. Difficult to open	2. Repair
3. Door will not fully open	3. Repair or remove obstructions
4. Door glazing cracked/broken	4. Replace
5. Not identified as containing fire equipment	5. Provide identification
6. Visible obstructions	6. Remove
7. Not all valves are easily accessible	7. Remove non-fire related materials
PRESSURE REGULATING VALVES (if applicable)	
1. Valves are in the incorrect position.	1. Place in correct position
2. Valves are leaking.	2. Repair
3. Valves are not maintaining downstream pressure.	3. Repair
4. Valves are not in good condition.	4. Repair or replace
FIRE DEPARTMENT CONNECTIONS (FDCs)	
1. FDCs are not visible or are not accessible.	1. Correct
2. Couplings or swivels are damaged or do not rotate smoothly	2. Repair or replace
3. Plugs or caps are not in place or are damaged	3. Repair or replace. Inspect interior of FDC for obstructions. Verify that valve clapper is operational over its full range.
4. Gaskets are not in place or not in good condition.	4. Repair or replace
5. Identification signs are not in place.	5. Replace.
6. Check valve is leaking	6. Repair
7. Automatic drain valve (ball drip) is missing or is not operating properly.	7. Repair or replace
8. Components are not in good repair.	8. Repair or replace

APPENDIX B**TESTING REQUIREMENTS**

- Quarterly: Test per NFPA 25. Test water flow alarms by flowing water from the most remote hose valve supplied by the piping associated with the flow alarm zone being tested. Verify appropriate water flow alarm is received at local panel.
- Semi-Annual: Test per NFPA 25. Test standpipe supervisory signals (ex. valve tamper switches, etc.).
- Annually: Fully close and reopen the standpipe control valve(s).
- Test per NFPA 25. For pressure regulating valves, conduct a partial flow test adequate to remove the valve from its seat.
- Other: Test per NFPA 25. Initially and every five years thereafter, conduct an initial flow test by flowing the required volume of water at the hydraulically most remote, highest, or dead-end hose connection of each zone of the standpipe system. When not practical, consult FWO-FIRE for a more appropriate location for the test.
- Flush/test per NFPA 25. Initially, and prior to return of any repaired or modified system to service, perform the following:
- * Flush piping at not less than the water demand rate of the system.
 - * Hydrostatically test the system at not less than 200 psi for 2 hours, or 50 psi in excess of maximum pressure (where maximum pressure exceeds 150 psi).